From:	[redacted]
To:	East Anglia ONE North; East Anglia Two
Subject:	DEADLINE 2 SUBMISSION- EN010077 East Anglia ONE North and EN010078 East Anglia TWO Wind Farms - Post hearing submissions including written submissions of oral case (OFH4)
Date:	17 November 2020 14:59:46
Attachments:	blccloghfoppohgd.png W Halford - Written Submission of Oral Submission at OFH4.pdf EN010025-000044-East Anglia One Change request Decision Letter Compressed.pdf NG_EDR Compressed.pdf EN010077-002766-DL1 - SASES - Written Representation Schedule of Related Projects.pdf

Dear Case Team,

Please find attached:

1. My post hearing submission including written submission of my oral case - including last 3 paragraphs that I did not manage to say within the 5 minutes limit.

Together with two documents referenced in my oral submission:

i) Secretary of State letter of Consent approving PA2008 Application for a non-material change to the East Anglia ONE Offshore Wind Farm Order 2014

ii) National Grid: Electricity Transmission - Delivering our environmental future" Annual Statement - March 2018 - se case Study 3 Scottiosh Power on page 10

2. A list of 'Other Energy Projects' that would make landfall and connection within an approx. 4 square miles triangle of land between Leiston, Sizewell, Thorpeness and Friston

Mr Rynd Smith asked me at OFH4 to supply such a list. This list was also submitted by SASES at Deadline 1 [Rep1-352]

Regards,
William Halford
Substations Action Save East Suffolk (SASES)

SASES IP Registration identification numbers
20024106 (EA1N)
20024110 (EA2)

The submission of two separate DCOs has caused great confusion. Several speakers at previous OFHs (including our local MP) have referred to a 32m motorway- wide cable corridor. The combined width of the two Cable Corridors including haul roads would be **64 metres,** the width of nearly three dual carriage motorways. This has not been highlighted by the Applicant.

These projects were planned to make landfall further south at Bawdsey, and to use the consented EA1 cable route from there to the Grid at Bramford.
Scottish Power was later granted up front funding for only 60% of the Gigawatt generating power that it had planned for East Anglia ONE. That capacity downgrade led the Project Manager to request a non-material Change[1] from HV DC to HV AC, an unfortunate consequence being that there would no longer be sufficient cable ducts there for EA1N and EA2. National Grid offered an alternative Grid connection in the "Leiston area". I have found no evidence in their heavily redacted CION assessments to indicate they took any account of the impact onshore of that decision.

At some point during 2017, SPR appears to have decided on a B1122 east-west crossing point slap through the middle of Aldringham, between the grounds of Aldringham Court and Fitches Lane, there being 100 or so metres of woodland either side of the road, a gap in the B1122 ribbon development.

A functional requirement for a route for the cable corridor at that time was a 50 metres width. Responding to Local Authority concerns that felling so many trees on the west side would destroy the "visual aspect" of Grade II Listed Aldringham Court, SPR offered to reduce cable corridor width there from 50m to 16m, or 27m for both projects. There is no evidence that other crossing points were evaluated and SPR continues to say that is the only feasible crossing place, despite having reduced the overall "width requirement" by nearly 50%.

There is a second just under 1 Hectare of woodland on the east side between B1122 and the River. Scottish Power has not offered a reduced width there, far from it. Its Plans show it would take out 93m, 100m where it intends to run cabling and haul roads across the River.

The Applicant also proposes a 4-way, over 40 metres wide swept path HGV turning geometry (at AC-3) where haul roads would meet the B1122 on both sides of the road. Its justification is a mystery, since the Applications indicate that HGV traffic is to be reduced there to the minimum necessary to serve that section (Section 3B) of haul road.

Woodland on the east side is part of a long stretch of unmanaged mature woodland, extending much further south along the west bank of the River. It has been central to the ecological and visual setting of the Aldringham River Hundred Special Landscape Area and flood plain. It has become an ideal home to many wild birds and other animals, such as bats, owls, woodpeckers, and deer, even glow worms. Nowadays it would be described as a unique area of "rewilding" well ahead of its time. No mention of that in the Applicant's ecological assessments, focused instead on the AONB and SSSI – nor any commitment to replant on project completion.

The back gardens in Gipsy Lane include a continuation of that long stretch of riverbank woodland, where there is an amazing variety of wild life including nightingales.

My own riverside back garden is situated only 20 metres at closest from the Order Limits at the River Hundred crossing point, and the house itself is 75 metres away from the Cable Corridor.

The impact on our lives from construction noise at B1122, the river crossing works and pumps, from the haul road, dust and light pollution, closure of B1122 during open trenching etc etc may continue for perhaps 9 or 10 years, unless the projects are built concurrently. The prospect is quite horrific. SPR does not seem to accept this and has been unprepared so far to include mitigation measures in its design.

There are more projects to come, the most advanced being Nautilus. National Grid Ventures has been consulting with local parish councils and has written to residents informing them about its plans to conduct surveys on their land, saying it is exploring various routes to Friston, including the SPR cable route. No time here to say more about Nautilus and other projects to come, save to say I fully support County Councillor Russ Rainger's words on cumulative impact at Open Floor Hearing 3.

You may be interested to hear National Grid's boast to Ofgem in its March 2018 Electricity Transmission Annual Statement entitled "Delivering our environmental future" [2]. This was National Grid's application for an Ofgem Environmental Reward'.
On page 10, "*Planning for a low-carbon future – Case Study 3*" National Grid claimed that:

"Working with Scottish Power to review the design of East Anglia offshore wind projects EA1N & EA2, National Grid identified that a connection would be available closer to the project itself. For this connection to occur we would need to reconfigure the offshore development area, and change the technology from HVDC to HVAC. This review has enabled the project to be more economic and competitive in the forthcoming round of Contracts for Difference auctions".

This National Grid report seems to be saying that the selection of a connection at 'Leiston' in place of Bramford via Bawdsey was made in order to make cable landfall closer to the offshore turbines than Bawdsey and was not a direct consequence of the East Anglia ONE non-material Change Request. This is not consistent with the reasons stated in the letter consenting the Change Request[1].
These two DCO planning applications to make a separate landfall at the Thorpeness beauty spot, constructing two additional onshore cable corridors 9Km long across creating a large industrial energy complex at Friston are a direct consequence of that decision.
It is outrageous that National Grid put these projects forward as a case study in support of its environmental credentials.

I ask that ExA recommends refusal of both applications, but should you eventually be minded to recommend approval, I ask that you do so only once there is a firm commitment for significant mitigation measures to minimise damage to those living close to the cable corridor. …….. and to the final years of our lives here in Aldringham. Thank you for listening.

References

1. Secretary of State letter of Consent dated 24 March 2016 approving PA2008 Application for a non-material change to the East Anglia ONE Offshore Wind Farm Order 2014
2. National Grid: Electricity Transmission - Delivering our environmental future" Annual Statement - March 2018

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24 March 2016

Dear Sirs

PLANNING ACT 2008
APPLICATION FOR A NON-MATERIAL CHANGE TO THE EAST ANGLIA ONE OFFSHORE WIND FARM ORDER 2014

1. I am directed by the Secretary of State for Energy and Climate Change (the "Secretary of State") to advise you that consideration has been given to the application (the "Application") which was made by East Anglia ONE Limited ("the Applicant") on 19 May 2015 for a change which is not material to the East Anglia ONE Offshore Wind Farm Order 2014 ("the 2014 Order") under section 153 of, and Schedule 6 to, the Planning Act 2008 (the "2008 Act").

2. The original application for development consent under the Planning Act 2008 was submitted to the Planning Inspectorate by the Applicant on 8 November 2012. Development consent was granted by the Secretary of State on 16 June 2014 for the construction and operation of an offshore wind turbine generating station in the North Sea, a minimum of 43km off the coast of Suffolk, comprising up to 240 wind turbines with a gross electrical capacity of up to 1200MW and associated offshore and onshore infrastructure.

3. The Applicant is seeking consent for a change to the 2014 Order to allow an option to construct either a 750MW wind farm with a High Voltage Alternating Current ("HVAC") transmission system or a 1200MW wind farm with a High Voltage Direct Current ("HVDC") transmission system which was permitted in the 2014 Order. (The wording of the Application means that only one option could be constructed under the Order – construction of both options would not be permitted.) The change to the HVAC

transmission system would generate a need for an increase in the height of the electrical equipment at the onshore sub-station.

4. The Application was made because the East Anglia ONE project participated in the first Allocation Round of the Contract for Difference scheme and was awarded a contract for 714MW of capacity on 26 February 2015. The Applicant considers that a project of that size would need to connect to the National Grid transmission system through HVAC technology rather than HVDC apparatus. The request for a varied project with a capacity of up to 750MW allows for transmission losses. While the 2014 Order would allow a project with a 750MW generating capacity to be built, the proposed HVAC transmission system would not be permitted.

Summary of the Secretary of State's Decision

5. The Secretary of State is satisfied that the change requested by the Applicant is not material and has decided under paragraph 2(1) of Schedule 6 to the 2008 Act to make a non-material change to the 2014 Order so as to authorise the changes detailed in the Application. This letter is the notification of the Secretary of State's decision in accordance with regulation 8 of the Infrastructure Planning (Changes to, and Revocation of, Development Consent Orders) Regulation 2011 (as amended) ("the Change Regulations").

Consideration of the materiality of the proposed change

6. There is no statutory definition of what constitutes a 'material' or 'non-material' amendment for the purposes of Schedule 6 to the Planning Act 2008 and Part 1 of the 2011 Regulations. Different procedures need to be followed depending on whether a change is deemed to be material or non-material. Paragraphs 9 – 16 of the Department of Communities and Local Government's publication "Guidance on Changes to Development Consent Orders" (December 2015) ("the DCLG Guidance") sets out a number of characteristics that provide a differentiation between non-material and material changes. Criteria that suggest a change may be material are:

   (a) where any new or materially different effects on the environment as a result of the change mean that an update to the original ES (from that at the time the original Development Consent Order was made) is required (to take account of those effects);

   (b) where the impact of the development to be undertaken as a result of the proposed change invokes the need for a new Habitats Regulations Assessment (HRA), or the need for a new or additional licence in respect of European Protected Species ("EPS") (in addition to those at the time the original Development Consent Order was made);

(c) where the change would involve compulsory acquisition of any land that was not authorised through the existing Development Consent Order; or

(d) where the proposed changes have a potential impact on local people and businesses.

7. The Secretary of State therefore began her consideration of the materiality of the proposed variation by considering the matters set out in paragraph 6 above:

(a) The Applicant supplied information which compares the proposed parameter changes against the worst case scenarios applied in the original Environmental Statement. The conclusion of this analysis was that there would be increased impacts on only a small number of parameters: the maximum height of some equipment at the onshore sub-station and the maximum number of onshore cables permitted (although these would be located within the same number of trenches as permitted under the 2014 Order).

(b) While there has been no increase in the extent of any environmental impact change nor are there any new impacts from the proposed changes to the 2014 Order, in the light of a consultation on a possible Special Area of Conservation ("pSAC") being considered under the Habitats Regulations, DECC officials have undertaken a Habitats Regulations Assessment of the likely impacts on harbour porpoise of the proposed Southern North Sea pSAC as required by the Habitats Directive. However, we do not consider the need for this HRA to have been triggered by a change in environmental impacts resulting from the proposed changes to the 2014 Order. In addition, there is no indication from Natural England (NE) or any other statutory nature conservation body or non-Government Organisation that there is a need for any new or additional EPS licence to be granted before the changes requested by the Applicant could be put into effect.

(c) There are no changes to the compulsory acquisition provisions set out in the 2014 Order.

(d) The potential impacts on local people and businesses are no greater than those that arise from the development permitted by the 2014 Order.

8. The Secretary of State therefore concludes that none of the specific indicators referred to in the DCLG Guidance suggest that the proposed

changes are a material change. She has also had regard to the effect of the changes and considered whether there are any other circumstances in this particular case which would lead her to conclude that the proposed changes are material but has seen no evidence to that effect.

9. The Secretary of State is therefore satisfied that the changes proposed in the Application are not material and should be dealt with under the procedures for non-material changes.

Consultation and Responses

10. The Planning Inspectorate on behalf of the Secretary of State publicised the Application in accordance with regulation 6 of the Change Regulations and on 5 June 2015 consulted the persons specified in regulation 7 of the Change Regulations in the manner prescribed. The deadline for receipt of representations on the Application was 20 July 2015.

11. The Planning Inspectorate received representations within the deadline for receipt of representations from: the Marine Management Organisation, NE, Suffolk County Council, Suffolk Coastal District Council, Mid-Suffolk District Council, Medway Council, the Office of Road and Rail, Anglian Water, the Civil Aviation Authority, the Environment Agency, Historic England, GTC, Vodafone, Public Health England and one individual.

12. On 19 January 2016, the Joint Nature Conservation Committee ("the JNCC") issued a consultation on pSACs for harbour porpoise, including one in the Southern North Sea which overlaps the site of the East Anglia ONE Offshore Wind Farm and is a single feature site proposed for the purpose of aiding the conservation of harbour porpoise populations throughout UK waters. On 21 January 2016, NE consulted on potential extensions and the addition of features to two Special Protection Areas (SPAs) – the Hamford Water SPA and the Outer Thames Estuary SPA. The term `potential SPA' ("pSPA") applies to proposed extensions of SPAs and the addition of new features to existing sites. In view of these consultations, and the fact that pSACs and extensions to potential SPAs are treated as a matter of Government policy as if they were `designated' sites, the Secretary of State was obliged to consider the likely significant effects of the proposed changes on the pSAC and potential SPA extensions both alone and in combination with other plans or projects.

13. The Secretary of State, therefore, initiated a consultation on 5 February 2016 published on the Planning Inspectorate website ("the Secretary of State`s consultation") in order to inform her consideration of the potential impacts of the Application on a pSAC being considered in the Southern North Sea (for harbour porpoise) and on two extensions and addition of features to existing Special Protection Areas ("SPAs") (together "the SoS

consultation"). The Secretary of State's consultation sought comments on the potential impact of the Application on those sites and included some specific wording that was being considered as a Requirement for inclusion in the Order to provide suitable protection for the harbour porpoise feature of the pSAC from any impacts of the proposed changes. Consultation responses were received from: The Wildlife Trusts, Whale and Dolphin Conservation, WWF-UK, NE, the JNCC, the Marine Management Organisation ("the MMO") and the Applicant. On 23 February 2016, the Secretary of State sought views from all parties with an interest in the issue. No further comments were received.

Potential Impacts Raised by Consultees

Electro-Magnetic Fields ("EMFs")

14. Concerns were raised about the potential impacts of HVAC cabling on human health.

Mitigation Measures for the Impacts of the Development

15. A respondent requested that planners "give regard to the affects [sic] the construction work will have on the local community and consider a reasonable mitigation package". Concerns were raised about the lack of mitigation measures to alleviate the impacts of the proposed development and a number of other projects were cited where developers had provided such mitigation.

Visual Impacts from Onshore Sub-station Equipment

16. Concerns were expressed about the potential impacts of changes in the height of certain pieces of electrical equipment at the onshore sub-station.

Consideration of Potential Impacts Raised by Consultees

Electro-Magnetic Fields

17. Public Health England, in its consultation response, states that the Applicant should be required to provide the operating voltages and confirm that the fields arising from them will comply with ICNIRP (International Commission on Non-Ionizing Radiation Protection) exposure guidelines [in accordance with Government Code of Practice, "Power Lines: Demonstrating compliance with EMF public exposure guidelines (March 2012)".

18. The Applicant comments in the documentation that accompanied the Application that *"with respect to EMF, the proposed electrical infrastructure for the East Anglia ONE offshore windfarm will comply with Government*

policy and with UK exposure guidelines. The resultant electric and magnetic fields generated will be extremely low, or negligible, and will fall well under the accepted UK guidelines on exposure levels."

19. Given the statement from the Applicant confirming that it will comply with Government policy and with relevant UK guidelines, the Secretary of State considers that suitable protection exists such that she is able to conclude that there will be no significant impact on human health from the adoption of a HVAC transmission option.

Mitigation for Onshore Works

20. While there will be an increase in the number of cables being installed for any HVAC option when compared to the number of High Voltage Direct Current cables permitted by the 2014 Order, these will still be laid in the same number of trenches as proposed for the original application. The impacts of the trenching for the original proposal were fully considered by the Examining Authority for the East Anglia ONE project and the decision was taken that suitable mitigation for that activity (and other onshore works more generally) was provided within the recommended East Anglia ONE Offshore Wind Farm Order and that consent could, therefore, be granted. The Secretary of State does not consider that any further measures are needed now in respect of this matter.

Visual Impacts of the Onshore Works

21. While an HVAC transmission option would result in a decrease in the maximum building height of the onshore sub-station from 25 metres to 21 metres, there would be an increase in the maximum height of the outdoor electrical infrastructure from 10 metres to 15 metres. The dimensions of the proposed HVAC sub-station would be dependent on the balance of indoor and outdoor equipment but would be less than the dimensions granted development consent in the 2014 Order.

22. The visual impact of the proposed onshore sub-station featured quite heavily in the Examination of the original application for development consent. The Report from the Examining Authority in the Planning Inspectorate states: *"It also finds that significant residual visual impacts resulting from the OCS [Onshore Converter Station], especially as experienced in Burstall, would remain particularly from those viewpoints that would not be subject to off-site planting. However, because of the mitigation referred to throughout this subchapter, as embedded in the scheme set out in the recommended Order, and because of the requirement for local authority approval of the landscaping approach, the Panel concludes that these residual landscape and visual impacts are*

outweighed by the national need for renewable energy infrastructure as set out in Part 3 of NPS EN-1."

23. The views of Suffolk County Council, Suffolk Coastal District Council and Mid Suffolk District Council were that the overall significance of effects would not be altered by the changes sought in the Application.

24. The purpose of the Application is to permit an option for a wind farm with a lower generating capacity than that set out in the 2014 Order with a different transmission system. As indicated above, the generating station element of the smaller project could be built under the terms of the existing Order (there was no minimum capacity specified) but the changes to the transmission system could not.

25. Given the potential impacts from a variation of the maximum permitted height of some of the onshore works, the Secretary of State has considered whether those impacts are outweighed by the benefits, including the need for the development. The Secretary of State in a speech dated 18 November 2015 stated that "New nuclear, new gas and, if costs, come down, new offshore wind will all help us meet the challenge of decarbonisation." In addition, the Secretary of State notes that the Overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Renewable Energy Infrastructure (EN-3) both set out that electricity generation from offshore wind farms is expected to contribute a significant proportion of renewable energy generation. The Secretary of State considers, therefore, that the need for a project, even with a reduced capacity of 750MW, is established. She further considers that the potential benefits of the project including low carbon electricity generation capacity outweigh the potential adverse impacts.

Habitats Regulations Assessment

26. The Secretary of State considered the relevant and important policies in respect of the United Kingdom's international obligations as set out in the Offshore Marine Conservation (Natural Habitats, &c) Regulations 2007 ("the Offshore Habitats Regulations") and the Conservation of Habitats and Species Regulations 2010 (as amended) ("the Habitats Regulations") which transpose the Habitats Directive (92/43/EC) into UK law. Both sets of Regulations require the Secretary of State to consider whether the development would be likely, either alone or in combination with other plans and projects, to have a significant effect on a European site or European Offshore Marine Site, as defined in the Habitats Regulations and the Offshore Habitats Regulations respectively. If likely significant effects cannot be ruled out, then an Appropriate Assessment must be undertaken by the Secretary of State pursuant to regulation 61(1) of the Habitats Regulations and regulation 25 of the Offshore Habitats Regulations to

address potential adverse effects on site integrity. The Secretary of State may only agree to the Application if she has ascertained that it will not adversely affect the integrity of a European site or European Offshore Marine Site.

27. As indicated above, on 19 January 2016, the JNCC issued a consultation on pSACs for harbour porpoise, including one in the Southern North Sea and on 21 January 2016, NE consulted on possible extensions and addition of features to the Hamford Water SPA and the Outer Thames Estuary SPA. The Secretary of State, therefore, treated the pSAC and the potential SPA extensions as if they were 'designated' sites and considered the likely significant effects of the proposed changes on their integrity both alone and in-combination with other plans or projects.

28. As indicated in paragraphs 10 – 13 above, as part of her consideration, the Secretary of State consulted a range of organisations and people in order to seek their views on the potential impacts of the Application. The views received are set out below.

The MMO

29. In response to the Secretary of State's consultation, the MMO stated that, while it was important the potential impacts on the SAC were considered as part of the change application, it felt that some of the wording proposed for the new pSAC-related Requirement in the Order was unnecessary as the provisions were already set out in legislation and were, therefore, already a legal requirement, while other parts duplicated provisions in the Deemed Marine Licence that formed part of the 2014 Order.

NE

30. In response to the Secretary of State's consultation, NE re-iterated its previous view that it had no nature conservation concerns with the change proposal. NE also stated that it did not consider there was a need for the Secretary of State to include an additional pSAC-related Requirement in the 2014 Order. NE also pointed out that the deemed marine licence for the consented Development already contained a provision requiring the Applicant to provide a Marine Mammal Mitigation Protocol ("MMMP") and that a draft of such a Protocol had already been submitted to NE by the Applicant and that, in considering its suitability, an assessment of the potential impacts on the pSAC would have to be undertaken.

31. Finally, NE stated that the Application would not pose a Likely Significant Effect on either of the two SPAs that were also subject to the consultation.

The JNCC

32. The JNCC's response to the Secretary of State's consultation broadly agreed with the Secretary of State's proposed wording for a Requirement linked to pSAC protection but suggested that the injury and disturbance provisions should be linked to the Offshore Marine Conservation (Natural Habitats &c) Regulations 2007.

33. In addition, the JNCC indicated that irrespective of any changes to the 2014 Order, it would expect to see a review of the Order when any formal submission of the Southern North Sea pSAC was made to the European Commission (as a candidate SAC).

Whale and Dolphin Conservation

34. WDC considered that a reduction in the number of turbines being deployed at the site of the East Anglia ONE offshore wind farm would result in a lesser impact on marine mammals and that this was a positive outcome. However, it pointed out that there was already a requirement for a MMMP in the 2014 Order, and that the additional wording being proposed would only mean that integrity of the pSAC was not adversely affected.

35. WDC also stated that as the Secretary of State had indicated that there is the potential for adverse effect on the integrity of the Southern North Sea pSAC in combination with other projects, the mechanism for regulating that impact should not be the MMMP but an appropriate assessment with any relevant mitigation measures included in the order, when any review of the consent was carried out. WDC sought clarification on whether the proposed condition would obviate the need for a review of the consent when any formal submission of the Southern North Sea pSAC was made to the European Commission (as a candidate SAC).

WWF-UK

36. Overall, WWF had no objection to the Application indicating that a smaller project with fewer turbines than was originally proposed would lead to a reduction in noise impacts on marine mammals. The WWF also asked about the relationship between the Application and any review of consents needed when any formal submission of the Southern North Sea pSAC was made to the European Commission (as a candidate SAC).

The Wildlife Trusts

37. The Wildlife Trusts had no fundamental concerns regarding the Application and the potential impacts on the pSAC, but did query how any

consideration of the change application would relate to the need for a review of the consent when any formal submission of the Southern North Sea pSAC was made to the European Commission (as a candidate SAC).

The Applicant

38. Bond Dickinson on behalf of the Applicant questioned whether the proposed additional Requirement was necessary given that the deemed marine licence already contained provisions related to marine mammal mitigation. Bond Dickinson suggested changes to the proposed text and proposed that any relevant wording should be included in the deemed marine licence rather than the 2014 Order.

Conclusions on Habitats Issues

39. DECC carried out a Habitats Regulations Assessment (HRA) of the potential impacts of the change application on the Southern North Sea pSAC and the SPA extensions and addition of features. On the SPA extensions and addition of features, the HRA concluded that there would be no likely significant effect from the Application on each of the SPAs and that an appropriate assessment would not, therefore, need to be carried out.

40. However, the HRA's conclusion on the potential impacts on the Southern North Sea pSAC was that there could be a likely significant effect on the conservation objectives of the pSAC and, therefore, an appropriate assessment would be needed. The appropriate assessment considered the potential for; injury, noise disturbance and displacement as a result of piling activity and vessel movements during construction; the potential for collisions with construction and maintenance vessels; potential changes to feeding habitats and prey distribution during construction and operation; and, the potential in-combination noise disturbance and displacement impacts from other nearby offshore wind farms, dredging activities and seismic surveys.

41. The appropriate assessment notes that the Applicant proposed embedded mitigation measures within the original East Anglia ONE wind farm project envelope to offset the potential noise impacts to harbour porpoise from the piling of foundation structures by the use of pin piles which will reduce peak noise levels (from those associated with the installation of monopile foundations, for example) and by the use of 'soft start' procedures as per JNCC guidance on minimising the risk of disturbance to marine mammals. However, the appropriate assessment also refers to the need for further mitigation as proposed by the Secretary of State's additional Requirement to prevent an adverse impact on the harbour porpoise feature of the Southern North Sea pSAC.

42. In response to the concerns raised in relation to the appropriateness of a further Requirement to provide protection for the harbour porpoise features of the pSAC, the Secretary of State considers that:

    (i) The wording of the relevant conditions in the Deemed Marine Licences in the 2014 Order would not necessarily provide suitable full protection in respect of the pSAC as it relates only to one aspect of protection for marine mammals i.e. from acoustic disturbance;

    (ii) While it is possible that the MMO could vary the relevant conditions in the deemed Marine Licence, so that they include the necessary protection, the Secretary of State must be satisfied that is the position before making a decision to make the changes and cannot rely on the MMO doing so and, for this reason the Secretary of State must take action to satisfy herself that appropriate measures are being taken to ensure that there is no adverse effect on the integrity of the interest features of the Southern North Sea pSAC;

    (iii) While acknowledging that this approach might require separate marine mammal mitigation processes to discharge both the proposed new Requirement, and the corresponding conditions in the deemed Marine Licences, the Secretary of State considers that it is possible that one protocol could be prepared to cover both the Requirement and deemed marine licence conditions which could be submitted to both the MMO and DECC for approval.

43. In response to concerns about whether the new Requirement would obviate the need for a review of the 2014 Order when the specific details of the pSAC are submitted to the European Commission (as a candidate SAC), the Secretary of State does not see the Requirement as a replacement for such a review which would be undertaken at the appropriate time.

Environmental Impact Assessment

44. The Secretary of State has considered whether the Application would give rise to any new significant effects or materially different effects when compared to the effects set out in Environmental Statement for the development authorised by the 2014 Order.

45. The Secretary of State is satisfied that the 'Supporting Environmental information' provided is sufficient to allow her to make a determination on the Application.

46. As there are no new significant environmental impacts as a result of this proposed change, the Secretary of State does not consider that there is any need for consultation on likely significant transboundary effects.

General Considerations

Deemed Marine Licence

47. The Secretary of State notes that certain of the changes to the 2014 Order being sought by the Applicant apply equally to the deemed marine licence for the East Anglia One wind farm. Consequently, the Applicant has made an application to the MMO to make similar changes to the dML.

Equality Act 2010

48. The Equality Act 2010 introduced a public sector "general equality duty". This requires public authorities to have due regard in the exercise of their functions to the need to eliminate unlawful discrimination, harassment and victimisation and any other conduct prohibited under the Act; advance equality of opportunity between people who share a protected characteristic and those who do not; and foster good relations between people who share a protected characteristic and those who do not in respect of the following "protected characteristics": age; gender; gender reassignment; disability; marriage and civil partnerships[1]; pregnancy and maternity; religion and belief; and race. The Secretary of State is satisfied that there is no evidence of any harm, lack of respect for equalities, or disregard to equality issues in relation to this Application.

Human Rights Act 1998

49. The Secretary of State has considered the potential infringement of human rights in relation to the European Convention on Human Rights, by the Development. The Secretary of State considers that the proposed changes to the development consent granted under the 2014 Order would not violate any human rights as enacted into UK law by the Human Rights Act 1998.

Section 40(1) of the Natural Environment and Rural Communities Act 2006

50. The Secretary of State, in accordance with the duty in section 40(1) of the Natural Environment and Rural Communities Act 2006, has to have regard to the purpose of conserving biodiversity, and in particular to the United Nations Environmental Programme Convention on Biological Diversity of 1992, when granting development consent. The Secretary of State is of the view that the Application considers biodiversity sufficiently to accord with this duty.

[1] In respect of the first statutory objective (eliminating unlawful discrimination etc.) only.

Secretary of State's conclusions and decision

51. The Secretary of State considers that the impacts of the changes proposed are small when considered in context of the development authorised by the 2014 Order and that, for the reasons set out above, it is appropriate and advantageous to authorise the proposed change as detailed in the Application.

52. For the reasons given in this letter, the Secretary of State considers that there is a compelling case for authorising the proposed changes to the 2014 Order as set out in the Application. The Secretary of State is therefore today making the amending Order requested by the Applicant subject to new Requirement in respect of the Marine Mammal Mitigation Protocol and a number of minor modifications which do not materially alter its effect.

Challenge to decision

53. The circumstances in which the Secretary of State's decision may be challenged are set out in the note attached at the Annex to this letter.

Publicity for decision

54. The Secretary of State's decision on this Application is being notified as required by regulation 8 of the Change Regulations.

Corrections to the 2014 Order

55. The Secretary of State notes that the Applicant requested by way of a letter dated 20 June 2014 that correctable errors be made to the 2014 Order under section 119 of and Schedule 4 to the Planning Act 2008. The Secretary of State has considered the requested corrections and made those that are appropriate under the powers granted to her by the Act. Further details can be found in the `Corrections Notice` issued at the same time as this letter.

Yours sincerely [redacted]

Giles Scott
Head of National Infrastructure Consents and Coal Liabilities

ANNEX

LEGAL CHALLENGES RELATING TO APPLICATIONS FOR DEVELOPMENT CONSENT ORDERS

Under section 118 (5) of the Planning Act 2008, a decision under paragraph 2(1) of Schedule 6 to the Planning Act 2008 to make a change to an Order granting development consent can be challenged only by means of a claim for judicial review. A claim for judicial review must be made to the Planning Court during the period of 6 weeks beginning with the day after the day on which the Amending Order is published. The Amending Order as made is being published on the date of this letter on the Planning Inspectorate website at the following address:

http://infrastructure.planninginspectorate.gov.uk/projects/eastern/east-anglia-one-offshore-windfarm/?ipcsection=overview

These notes are provided for guidance only. A person who thinks they may have grounds for challenging the decision to make the Order referred to in this letter is advised to seek legal advice before taking any action. If you require advice on the process for making any challenge you should contact the Administrative Court Office at the Royal Courts of Justice, Strand, London, WC2A 2LL (0207 947 6655)

Electricity Transmission

Delivering our environmental future

Annual Statement March 2018

nationalgrid

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Who we are

National Grid is one of the largest investor-owned utilities focused on transmission and distribution activities in electricity and gas in the UK and US. We play a vital role in connecting millions of people to the energy they use, safely, reliably and efficiently.

We own and manage the grids that connect people to the energy they need, from whatever source. In Great Britain (GB) and the north-eastern states of the US we run systems that deliver gas and electricity to millions of people, businesses and communities.

National Grid Electricity Transmission (NGET) in the UK

Electricity Transmission Owner: We own and operate the high-voltage electricity transmission system in England and Wales. That includes around 7,200 kilometres of overhead line, about 650 kilometres of underground cable and 342 substations.

Electricity System Operator: As Great Britain's System Operator (SO) we make sure gas and electricity is transported safely and efficiently from where it's produced to where it's consumed. We seek to ensure that supply and demand are balanced in real-time and we facilitate the connection of assets to the transmission system.

Foreword David Wright

The energy landscape in which we operate is undergoing a period of significant change. In 2017, Great Britain achieved the first ever working day without coal power since the Industrial Revolution and broke 13 clean energy records. These milestones illustrate the rate of change.

"In recognition of our sustainable approach we were presented with the Business in the Community Award for Environmental Leadership for our work in reducing carbon in our construction activities."

David Wright
Director, Electricity
Transmission Owner

National Grid plays an important role in the sustainable development of Great Britain's energy sector. Our stakeholders expect us to deliver energy sustainably while balancing that with the need to provide security and affordability.

It's National Grid's job to facilitate an energy system that delivers value for consumers and society. We're developing an operational model that is in harmony with a low-carbon future by ensuring that low-carbon and renewable energy can be connected to the network, thereby significantly reducing the environmental impact of our day-to-day operations. This document recaps our strategy and outlines some of the initiatives that have contributed to its successful delivery during 2017/18.

Over the past year, National Grid Electricity Transmission (NGET) continued to operate as a single entity as both Transmission Owner (TO) and System Operator (SO). This will change by April 2019 when a new, legally separate Electricity System Operator will be established. For now it remains appropriate for this statement to showcase how both the TO and SO are working together to support Great Britain's transition to a low-carbon economy.

We continue to make good progress in delivering our environmental plan. During 2017/18 we harnessed the power of data to develop a Carbon Intensity Forecast tool for the GB electricity system, and worked closely with industry partners to look across the whole-system landscape and identify key areas of development to unlock additional network capacity for distributed energy sources.

We also refreshed our corporate sustainability strategy. 'Our Contribution' provides a blueprint for how we plan for the future and includes new targets to reduce greenhouse gas emissions, manage our consumption of resources better, and care for the natural environment. In recognition of our sustainable approach, in July 2017 we were presented with the Business in the Community (BITC) Award for Environmental Leadership for our work in reducing carbon in our construction activities.

Change in the energy landscape means we have to be versatile and highly innovative. This year we successfully energised the Sulphur Hexafluoride (SF_6) free gas insulated busbars at Sellindge Substation, onto the 400kV electricity transmission system. This is a world first.

Our unique role in Britain's energy system gives us the opportunity to be at the heart of change by really listening to our customers and communities, and working together to exceed their expectations. In this period we continued to build and strengthen our engagement activities. This included stakeholder workshops focused on Transmission Owner environmental issues. By holding face-to-face events, widening our involvement in industry and securing feedback on a range of publications, we are striving to deliver what's important to you. We are already planning our 2018 workshops and intend these to become annual events in our stakeholder engagement programme.

As with previous years, I'd very much welcome your views on this annual statement, as it helps us to focus on delivering what is important to stakeholders.

David Wright
Director, Electricity Transmission Owner

Context

This report is the National Grid annual executive statement for the Environmental Discretionary Reward (EDR), an Ofgem incentive that encourages the move towards a low-carbon energy system and high standards in environmental management. We have structured this report to show our actions over the last year and to show you our ambitions for the future.

The UK's commitment to the 2015 Paris Agreement and its long-term objective of a 2050 decarbonised economy has made the transition to a decarbonised energy system essential. National Grid plays a dual role in this challenge:

- as the Transmission Owner (TO) and System Operator (SO), we connect and support the operation and connection of low-carbon energy
- as an infrastructure business, we design, build and manage assets in a sustainable, affordable way while ensuring security of supply.

We also recognise that a sustainable approach can benefit from innovative thinking, so 'leading innovation' is an essential part of our strategy to improve performance.

The UK Government's Clean Growth Strategy was published in October 2017, focused on growing our national income while cutting greenhouse gas emissions. To accompany this strategy, the Government published its 25 Year Environment Plan in January 2018, which sets out the UK's long-term approach to protecting and enhancing the natural environment, particularly through using and managing land sustainably. Our environmental plans supports these strategies, as set out in this document.

This table shows our strategic drivers and initiatives which support our approach to the transition to a low-carbon future.

National Grid's transition to a low-carbon future				
Connecting low-carbon generation	How we'll operate the system in the future	Our climate commitment	Responsible resource use	Caring for our natural environment
		Excellent environmental management		
Planning for a low-carbon future – helping to decarbonise society's energy needs		Our Contribution – reducing our own environmental impact		
Leading innovation				
Drivers for our strategic initiatives				
An energy system that benefits the end consumer	Reduction in carbon can deliver reduction in costs	Reducing our contribution to climate change	Creating a positive legacy from our operations	Providing value for our stakeholders and customers

Planning for a low-carbon future

In the past, electricity flowed in one direction from transmission to distribution. In recent years, significant generation connections on the distribution networks have led to flows from distribution to transmission. These changes have led to some new challenges for operating the electricity system.

13 clean energy records

Low-carbon generation

- First 24-hour period without coal generated power since the Industrial Revolution
- Longest period without coal generation
- "Greenest summer" – more than half (52 per cent) of energy generated from low-carbon sources
- Lowest amount of carbon produced by electricity production at any one moment
- Largest amount of energy produced from renewables at any one moment
- First time wind, nuclear, and solar produced more than gas and coal

Solar

- More electricity generated from solar energy than ever before at a single moment, producing a quarter of Britain's energy supply
- Highest percentage of solar power produced relative to national demand

Wind

- Most wind power ever produced in a single day
- Most offshore wind power produced in a single moment
- Most electricity produced from all wind generation at any moment

Hydro

- Most electricity produced from hydropower at any one moment

Breaking Year

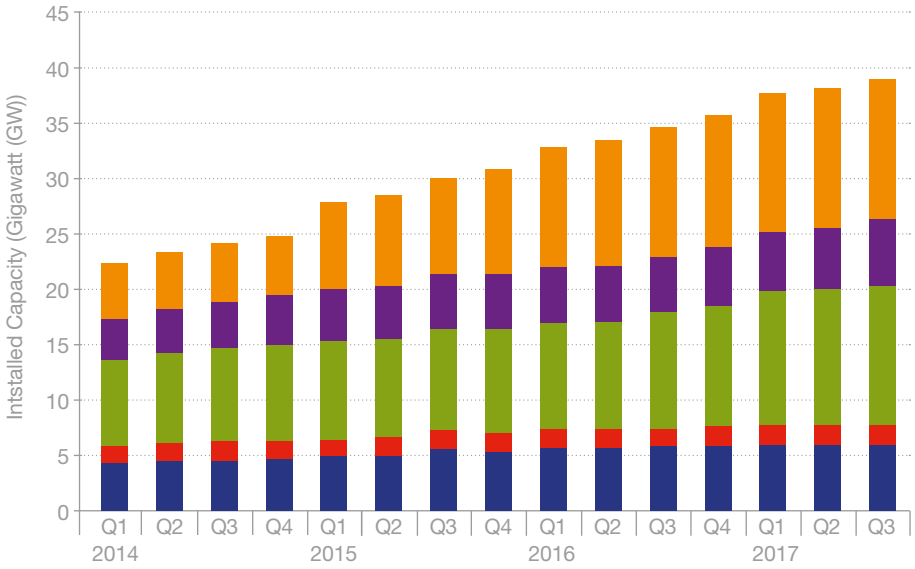
- This made 2017 a record breaking year

Source: https://www.wwf.org.uk/updates/britain-set-greenest-year-ever-clean-energy-breaks-all-records-2017

We are developing an energy system that supports Great Britain's low-carbon objectives. As the System Operator of the GB transmission network, we are already starting to deal with the beginnings of a low-carbon transition.

For example, 2017 saw 13 clean energy records broken, and at times, low-carbon generation, such as wind, solar and nuclear, generated more than coal and gas combined; showing very real progress towards a low-carbon future.

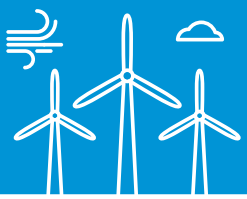
We have a duty and strategy to assist the move to a low-carbon network by supporting connections of all fuel types and technologies. Once low-carbon generation is connected, we need to operate the system to take advantage when the sun shines and wind blows to reduce the consumption of fossil fuels for energy.



England & Wales data extracted from Chapter 6 of *Energy Trends*: December 2017. Figures include installations accredited on all support schemes (Renewables Obligation, Feed in Tariffs, Contracts for Difference), as well as those not eligible for support or those that have been commissioned but are waiting for accreditation. This should particularly be noted for solar PV (and onshore wind), where figures incorporate many installations across several or all of these categories https://www.gov.uk/government/collections/energy-trends.

75%

British windfarms produced more electricity than coal plants on more than 75% of days in 2017



To ensure we can operate the system into the future, our network development strategies consider a variety of generation mixes in our Future Energy Scenarios[1]. In 2017, the shift towards decentralised and renewable generation was evident in all our scenarios: Two Degrees, Slow Progression, Steady State and Consumer Power. It was only the pace and extent of this change that differed.

These scenarios support the development of our Electricity Ten Year Statement[2] and System Operability Framework[3] which look at the future challenges faced by the network. The scenarios also feed into the Network Options Assessment[4] to make sure we have the right investment and commercial strategies to manage these operational changes. Our Electricity System Operator Forward Plan 2018/19 set out what we will deliver over the next year[5].

Active operation of distribution networks is now essential to manage distributed generation, storage, and commercial and industrial customers participating in the energy market. The increase in embedded generation will have a material impact on forecasting capability which is vital for balancing the system. We are currently exploring how these new roles could interact with existing roles and the governance and framework arrangements needed to support this.

This table shows how we are planning for a low-carbon future, and how three trends are influencing how we reshape our energy system: decarbonisation, decentralisation and digitisation.

The changing energy landscape

Planning for a low-carbon future – helping decarbonise society's energy needs

Connecting low-carbon generation		How we'll operate the system in the future
Unlocking network capacity for distributed energy connections and reducing constraints	Designing technical and commercial frameworks to make it easier and quicker to connect	Facilitating the transition to a smart, flexible, low-carbon electricity system that works for everyone
• Facilitating whole system outcomes • Offering opportunities for distributed energy resources to provide new services to the electricity transmission system	• Coordinating the system design of future low-carbon connections projects	• Creating energy markets that are simple and transparent • Programming software to forecast the share of renewable and non-renewable energy

1 **For more information please visit** https://www.nationalgrid.com/uk/publications/future-energy-scenarios-fes

2 **For more information please visit** https://www.nationalgrid.com/uk/publications/electricity-ten-year-statement-etys

3 **For more information please visit** https://www.nationalgrid.com/uk/publications/system-operability-framework-sof

4 **For more information please visit** https://www.nationalgrid.com/uk/publications/network-options-assessment-noa

5 **For more information please visit** www.nationalgrid.com/uk/about-grid/our-role-industry/future-electricity-system-operator

90%

Renewable energy sources provided more power than coal for 90% of 2017

Connecting low-carbon generation

In 2017, we were able to make a further 8.8GW of connection agreements with the GB distributed generation community. These agreements are with a mix of renewable generation and controllable peaking plants that have a capacity mechanism contract.

Because of increasing reliance on renewable technologies (such as wind) we must be able to supply back-up power for when these technologies can't meet demand (e.g. when the wind doesn't blow).

We are feeding our learning into the Energy Networks Association's Open Networks project, to support the development of longer-term processes and policies that will both support the connection of distributed generation and other technologies such as storage, as well as informing the transition of Distribution Network Owners (DNOs) to more active Distribution System Operators (DSOs).

Case Study 1:
Unlocking additional capacity for distributed energy resources

Background
The transition to a low-carbon grid is driving new connections to transmission and significant growth in connections to distribution networks.

Our aim is to join up network design and operation processes across transmission and distribution to ensure the most efficient decisions are made across all networks, accelerating the connection timescales and reducing costs to consumers. Opening markets to new service providers and improving ways of working across transmission and distribution will help us with the efficient management of transmission constraints and enable more Distributed Energy Resources (DER) connections.

What have we done this year?
The Regional Development Programme has developed a whole-system approach to support further economic and efficient connection of DER. This has involved:

- developing a new approach to whole-system network modelling that informs our understanding of operability issues and technical risks, revealing the potential for increased use of existing network capacity
- working with DNOs to deliver new connections process which provides greater certainty regarding our ability to accommodate DER connections
- creating a level playing field regarding service provision for both transmission and distribution customers by developing a standardised commercial services approach
- publishing a factsheet for DER developers informing them of the latest developments and next steps in our work to unlock further DER connection capacity
- continuous engagement with external stakeholder groups.

Much of this work is about collaboration and sharing of information within the current commercial and regulatory frameworks. As well as unlocking additional capacity for connection in the South East Coast region of England, the principles are in the process of being rolled out in the South West of England, as well as informing developments in the Dumfries & Galloway area of Scotland.

What's next?
We are ensuring that learning from the Regional Development Programme trials is fed into relevant work streams within the Energy Networks Association Open Networks project, including the development of the revised Statement of Works process[6].

We have also committed to undertake two further Regional Development Programmes in 2018/19.

Environmental benefits
- The project is connecting and using more renewable and low-carbon energy than would otherwise have been possible without traditional infrastructure investment (the construction of which would have consumed natural resources).

6
For more information please visit
https://www.youtube.com/watch?v=8GxeWsppmBI

3,720MW

It is hoped that this project will create the network capacity to enable UK Power Networks to connect a further 3,720MW of distributed generation in the area by 2050

Case Study 2:
Technical and regulatory innovation: Power Potential

Background
In January 2017 we started collaborative work with UK Power Networks (UKPN) on a Network Innovation Competition (NIC) project. The Power Potential project aims to create market access for distributed energy resources to participate in ancillary service provision to National Grid via UK Power Networks' coordination.

It is envisaged that the services provided by DER, such as local voltage support, will alleviate both transmission and distribution constraints, unlocking whole systems benefits such as additional generation capacity and operational cost savings to customers. The project's approach is being trialled on the South East coast network where a significant uptake of low-carbon energy resources has meant technical constraints in the area are now having an effect.

It is hoped that this project will create the network capacity to enable UKPN to connect a further 3,720 Megawatt (MW) of distributed generation in the area by 2050. We believe that this solution will allow for quicker and lower-cost connections than traditional transmission or distribution network investment.

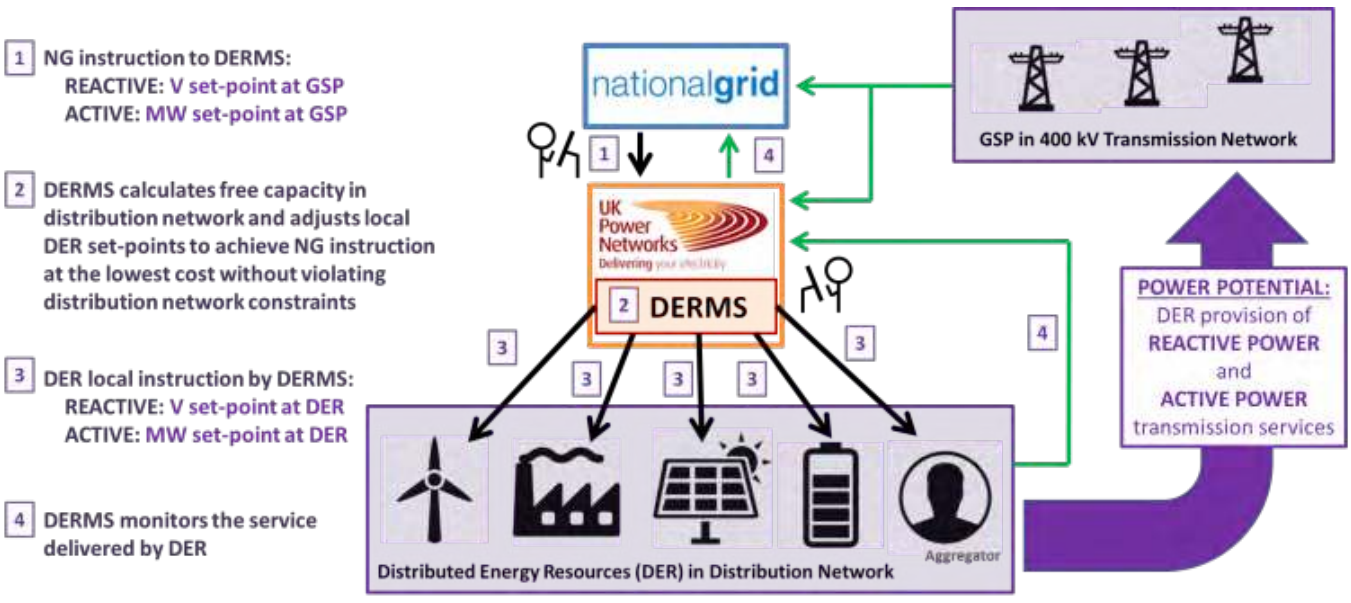
What have we done this year?
Substantial progress was made in the detailed technical and commercial design of the Power Potential solution and service.

A novel Distributed Energy Resources Management System (DERMS) was developed to facilitate communication between DER connected to UK Power Networks and National Grid.

In addition, we engaged with DER to consult on the commercial framework and encourage participation, as well as signing contracts with Cambridge University and Imperial College for academic research activity to support the commercial work stream.

What's next?
The project will continue throughout 2018, continuing our work with UKPN and our engagement with distributed energy resources to deliver the build and test phase of the technical and commercial solutions, ready for full trials in 2019.

Environmental benefits
- Deployment of 3,720MW of distributed generation, assuming it consists of solely renewable sources, results in an estimated reduction in carbon emissions of 5 $MtCO_2$ by 2050.



Benefits of battery energy storage:
Battery storage offers potential for supporting renewable energy. It is able to store and release energy when required; this is important for when the sun doesn't shine and the wind doesn't blow. It could deliver system stability, security of supply, helps to decarbonise UK energy supplies and addresses the intermittency challenge of renewable sources.

Benefits of offshore wind projects:
Offshore wind provides renewable energy and does not emit environmental pollutants or greenhouse gases. Offshore wind is an ideal technology for the UK with our shallow seas and strong wind and plays an important part in the long-term plan for a balanced low-carbon electricity generation portfolio.

Benefits of rail electrification:
The carbon emissions from electric trains are 20 to 35 per cent lower than diesel trains, and there are no emissions at the point of use, improving air quality pollution hot spots, such as city centres[7].

Case Study 3:
Forthcoming low-carbon connections

Part of the energy challenge is ensuring that new power sources, whether from nuclear, wind, solar or other technologies, are connected to the electricity transmission network; occasionally these connections are long and complex projects. During 2017/18 we made significant progress to make these low-carbon connections viable by supporting and advising on system design.

Statera Energy battery connection

In 2017, we finished studies to showcase the capability of storage connection options and formalised the contract to connect the largest battery connection application (300MW) in the UK so far, which can store enough electricity to serve approximately 100,000 homes.

This project will provide significant capability to store energy during the low demand periods. Although the connection will not be completed until 2022, this is an important step for National Grid to connect battery storage directly to the network. As intermittent and less flexible generation grows at transmission and distribution level, the ability to flex generation and demand is becoming increasingly important to maintain a balanced and stable network.

Working with Scottish Power to review the design of East Anglia offshore wind projects EA1N & EA2

We have worked closely with Scottish Power on the offshore wind projects EA1N and EA2. Working with Scottish Power, we reviewed the existing design and identified that a connection would be available closer to the project itself. For this connection to occur we would need to reconfigure the offshore development area, and change the technology from HVDC to AC. This review has enabled the project to be more economic and competitive in the forthcoming round of Contracts for Difference (CfD) auctions, so that the benefits of renewable generation can be realised.

When operational in 2026 and 2027 respectively, these offshore wind farms will have an overall installed capacity of 1720MW.

Preparing for the electrification of rail traction at Sundon with Network Rail

We worked with Network Rail and looked at the design of the electrification project at Sundon Traction Point. We are now delivering the project one year earlier to realise the benefits of rail traction electrification, earlier than originally scheduled.

7
For more information please visit
www.networkrail.co.uk/our-railway-upgrade-plan/key-projects/electrification

How we'll operate the system in the future

As the System Operator (SO) we have an important role to play in facilitating the transition to a smart, flexible low-carbon electricity system that works for everyone. New technologies and business models such as battery storage, electric vehicles (EVs) and demand side response (DSR) are deploying rapidly.

We've listened to stakeholders who have told us that there are multiple barriers for new market entrants and are changing to meet the evolving needs of the energy market, while consistently delivering improvements in consumer value. We are doing this by developing the markets and frameworks used to govern the electricity system, so that it removes barriers for entry and meet the needs of all existing and new market participants.

Working collaboratively with interested parties and partners is also helping us to deliver the right solutions, improving transparency of our needs and developing robust, cost-effective and innovative solutions for the benefit of the end consumer.

The future role of the System Operator

In 2017 we embarked on a two-year programme which is setting out the future role of the System Operator – our Future Role of the System Operator (FRSO) programme[8] – and looking at 'what' the SO does and 'how' we do it. The aim of this programme is to deliver change in four key areas: flexibility, whole system, network competition and level playing field, while ensuring a joined-up approach across them.

Our long-term vision for the future is for an Electricity System Operator (ESO) that thinks across networks, plays a more active part in the energy system and helps to shape frameworks for markets. The successful integration of new technologies is essential to delivering the transition to a low-carbon energy system that delivers value for consumers.

From April 2019, the ESO will be a legally separate company and will be independent from the Transmission Owner. As its role changes there will be a renewed focus on ensuring our ways of working meet our customers' needs.

"We want to deliver a more cost-effective energy system by 2021"

Case Study 1: Future of balancing services

Background

As the UK moves to a low-carbon economy, the way we operate the electricity system is evolving. A smart, flexible system that makes the best use of all energy sources available will enable us to meet our customers' needs in a balanced, efficient and economical way.

Industry frameworks and ways of working have evolved over decades to support the efficient and safe operations of a network in which energy and services were predominantly provided by a small number of transmission-connected generators. However, markets for balancing services need to continue to change to ensure all parties can participate on an equal footing, reducing costs to the consumer.

We want to deliver a more cost-effective energy system by 2021. To support this ambition, we're committed to creating energy markets that are simple, easy to navigate, transparent and deliver value to end consumers.

Our aim is to create balancing service markets that meet our changing system needs, and in which all technology types can compete on a level playing field. They will provide access to everyone in the industry – regardless of size – and embrace new technologies alongside existing ones.

What have we done this year?

We improved the information we share, to make it easier for the industry to see, and meet, future system needs. In June 2017, we launched the new 'Future Balancing Services' website https://www.nationalgrid.com/uk/electricity/balancing-services/future-balancing-services.

We are also simplifying our products to build transparency. We published our 'System Needs and Product Strategy' (SNAPS) report and put this in consultation to seek views from our stakeholders on five key system needs: Inertia and Rate of Change of Frequency (RoCoF), Response, Reserve, Reactive Power and Black Start.

This consultation[9] succeeded in establishing a clearer picture of the industry view on how our balancing services products should develop and how the transformation should be delivered. As a result, we rationalised our existing product suite through the removal of outdated products and created Product Roadmaps for two system needs: Frequency Response and Reserve.

What's next?

The aspiration for 2018 is to create further roadmaps for three additional system needs: RoCoF, Reactive Power and Black Start. We will also focus on removing barriers and ensure routes to market for all participants. Developing improved services in conjunction with industry is also part of the strategy.

Environmental benefits

- Increase flexibility of the electricity system.
- Create a route to market for distributed energy resources to participate in local and national flexibility markets.

8
For more information please visit
http://nationalgridconnecting.com/embracing-change-frso/

9
For more information please visit
https://www.nationalgrid.com/sites/default/files/documents/Summary_SNAPS_Consultation_vFinal.pdf

Clear and concise information that can tell consumers in advance, for example, when it's best to turn on washing machines, load a dishwasher or charge a car, is a step in the right direction towards a low-carbon future.

Case Study 2:
Carbon intensity forecast for the GB electricity system

Background
The changes to our electricity system are opening up more choices for consumers. Giving consumers more control is a required step towards a smart energy system that's fit for the future. Harnessing the power of data communications and creating a smarter grid is a way to achieve this.

What have we done this year?
We responded to feedback from various stakeholders: environmental groups and politicians, on the need for clear, transparent data to inform and facilitate market and consumer decision-making. We developed a creative and innovative reporting system never seen before.

In partnership with Environmental Defence Fund Europe, WWF and the Met Office, we developed a Carbon Intensity forecast tool for the GB electricity system. This is publically available through http://carbonintensity.org.uk/

The programming software combines National Grid and Met Office data to forecast the share of renewable and non-renewable energy that will be on the GB electricity grid over the next 48 hours, and the resulting carbon emissions.

We also provide our forecast data in a format that allows technology companies to build innovative apps and software that may possibly make a real difference to how and when people use energy. Clear and concise information that can tell consumers in advance, for example, when it's best to turn on washing machines, load a dishwasher or charge a car, is a step towards a low-carbon future by enabling households and businesses to use power when it is at its cleanest and potentially most cost-efficient.

What's next?
In 2018 we plan to regionalise the information down to each DNO area, giving a more localised prediction of the cleanliness of the electricity being consumed and support further decarbonisation.

Environmental benefits
- Empowers consumers with information they need to make cleaner energy choices.

Our environmental contribution

We're passionate about making a positive contribution to the environmental and energy challenges that our society faces. We want to preserve what we value now, so we safeguard it for future generations.

10
For more information please visit
https://www.nationalgrid.com/group/responsibility-and-sustainability/environmental-sustainability

These goals are not just a win for the planet. They go hand in hand with delivering value for our customers, shareholders, investors, employees and the local communities where we operate.

Our strategy

As we invest in developing low-carbon energy networks, we are also developing our strategic ambition to embed sustainability into our decision-making and processes.

National Grid's environmental sustainability strategy, 'Our Contribution'[10], sets out our ambition to create a sustainable legacy. It outlines targets to reduce greenhouse gas emissions, better manage our consumption of resources, and care for the natural environment.

Our strategy was originally developed in 2012 with a wide range of internal and external stakeholders and focuses on the areas where we can have a material positive impact.

In 2017 we refreshed our strategy to reflect policy changes, increased stakeholder expectation and reflect on progress made against existing targets. This updated strategy has a clearer suite of defined goals and targets that will help us continue to embed sustainability into our business and deliver measurable environmental outputs.

What's in the refreshed strategy?

	Climate change due to greenhouse gas emissions	Global pressure on our natural resources	Loss of natural environmental resources
Theme	Our climate commitment	Responsible resource use	Caring for the natural environment
Business benefit	• Drive cost efficiencies • Increase business's resilience to climate change	• Drive cost efficiencies • Reduce our risk to volatile markets, such as metals	• Increase value of our natural assets • Shared benefits with our communities
Our targets	• 80% reduction in greenhouse gas emissions by 2050 • 45% reduction in greenhouse gas emissions by 2020 See below for regional targets*	• Reuse or recycle 100% of recovered assets by 2020 • Send zero office waste to landfill by 2020	• Recognise and enhance the value of our natural assets on at least 50 sites by 2020 • Drive net gain in environmental value (including biodiversity) on major construction projects by 2020
*Regional targets	UK - Implement carbon pricing on all major investment decisions by 2020 - Reduce capital carbon from all our major construction projects by 50% by 2020 - Increase energy efficiency of our property portfolio by 10% by 2020		
	Consistently maintaining outstanding environmental standards		

What's next?

'Our Contribution' provides a blueprint for embedding sustainable decision-making into our day-to-day business operations. The next two years will focus on delivering our 2020 targets.

Our climate commitment

We all have a responsibility to safeguard the global environment for future generations. That's why we set ourselves ambitious climate commitments. By 2050, we aim to reduce our greenhouse gas emissions by 80 per cent (from a 1990 baseline), with interim targets of 70 per cent reduction by 2030 and 80 per cent reduction by 2050.

We are doing this by setting each of our business units an annual carbon budget. This is so that each unit has accountability and can see how they can contribute to reduce emissions. So far we have made a 63 per cent reduction from our 1990 baseline, so we are ahead of our target.

For our Electricity Transmission business, carbon emissions are made up of transmission losses (approx. 86 per cent), SF_6 emissions (approx. 12 per cent) and electricity and gas consumption at site use (approx. 2 per cent).

As part of our commitment to science based targets[11] and to be in line with the scale of reductions required to keep global temperature increase below 2 degrees compared to pre-industrial temperatures, this year we refreshed our emission reduction targets to include greenhouse gas emissions from electricity losses.

Leading the way

In 2017, we were recognised once more as one of the world's leading businesses on climate change action by maintaining our A score in the CDP Climate Change Disclosure project, scoring within the top 5 per cent of over 100 companies who participated globally. CDP (formerly Carbon Disclosure Project) is an important way for us to demonstrate our plans and performance in carbon management to our investors and other stakeholders[12].

We were also presented with the BITC Award for Environmental Leadership for our work in reducing carbon across the supply chain. The BITC Award honours businesses that are developing sustainable business models[13].

Current Performance:

63%

reduction in our business carbon footprint from a 1990 baseline

11
For more information please visit
http://sciencebasedtargets.org/

12
For more information please visit
https://www.cdp.net/en/scores-2017

13
For more information please visit
https://www.bitc.org.uk/resources-training/case-studies/national-grid-winner-bitc-award-environmental-leadership

70%

Reduction in greenhouse gas emissions by 2030

80%

Reduction in greenhouse gas emissions by 2050

Case Study 1:
Carbon weighting in decision making

Background

We recognise that to effectively address climate change we need to engage with our suppliers and contractors, and work together to drive action. We believe that by using our influence as a client it is possible to deliver tangible, meaningful change. Including carbon in our decision making, is one way we are doing this.

What have we done?

Sustainable construction

Finding new ways to design and build our assets is the cornerstone of our sustainability strategy. In particular, we have made significant progress in challenging our supply chain through competitive tendering to help us reduce carbon emissions and meet our targets.

We have a challenging target of 50 per cent reduction in the carbon intensity for new assets by 2020/21, compared to a 2014/15 baseline. This is underpinned by two key drivers: our business' contribution to climate change and that cutting carbon can cut cost.

We are on track to meet our 2017/18 carbon intensity target by reducing capital carbon intensity from a baseline of 188tCO_2/£m to 138tCO_2/£m, exceeding our target of a 10 per cent reduction. We also measured carbon on 43 schemes through development, demonstrating a 401tCO_2 carbon saving. This equates to taking just over 1,000 cars off the road for a year.

We are doing this by using our Carbon Interface Tool (CIT), a carbon footprint tool we have developed that is tailored to our assets. We ask our supply chain to complete a quantitative assessment of the projected carbon impact of their design solution. By making carbon a weighted element of the tender selection process, we go beyond existing good practice and unlock costs and carbon savings.

Sustainable supply chains

We are also working towards integrating environmental consideration into all relevant sourcing activity beyond our construction projects, where this is already embedded.

We have committed to having 80 per cent of our top 250 suppliers disclosing their greenhouse gas emissions via CDP by 2020. In 2017, 76 per cent of our top 250 suppliers disclosed their emissions. This is delivering an increase in climate change awareness and sustainability capability in our supply chain. In 2017, 63 per cent of our top suppliers reported emission reduction activities, an increase from 58 per cent in 2016.

In 2017 we developed an internal carbon pricing policy to ensure carbon is considered in our major investment decisions. We will use an internal carbon price of £45/tonne, alongside many other factors such as cost, legislative compliance and planning considerations.

Carbon pricing
In 2017 we developed an internal carbon pricing policy to ensure carbon is considered in our major investment decisions. We will use an internal carbon price of £45/tonne of carbon, alongside many other factors such as cost, legislative compliance and planning considerations.

Our aim is to roll out this approach to inform all our major investment decisions by 2020. This will prepare us for policy changes in the future, and help us meet our carbon reduction goals, as well as address climate change and deliver cost savings.

Environmental benefits
- Savings to date of 20,000tCO_2 capital carbon from our construction activities.
- Mitigate future risk as the decisions we make now can potentially lock-in carbon emissions for the next 40 years.
- Cutting carbon can cut costs.

Case Study 2:
Supporting low-carbon mobility

Decarbonisation of transport is an important part of the UK's 2017 Industrial Strategy. We are working with stakeholders to ensure cost-effective development of charging infrastructure. We are also encouraging our own employees to use EVs by developing charging infrastructure at our sites. And we are committed to decarbonising our own commercial fleet by 2030.

Background
As EVs become an increasing reality, we want electro-mobility to play an important role in the low-carbon transition.

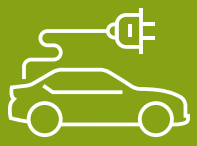
In 2016/17 we installed six EV charging units (supplying 12 cars) in National Grid House. This was part of a scoping trial to:
- provide facilities for early adopters in the employee and company car fleets
- support those colleagues keen to use hybrids and EVs in the future
- understand demand across the business
- support the business in delivering its environmental objectives.

Eighteen months into the project, occupancy is running consistently at 90 per cent with over 20,000 kWh of electricity being provided.

What have we done this year?
We assessed additional sites to install EV charging points and have committed to replacing our own UK commercial fleet of just over 1,000 vehicles with Alternative Fuel Vehicles (AFVs) by 2030.

What's next?
We're going to trial 20-30 commercial EVs in 2018/19 to identify optimum charging solutions and install 14 additional charging units across five National Grid sites.

Environmental benefits
- Improved air quality.
- Reduced carbon emissions from employee travel – up to 20 tonnes of carbon dioxide (CO_2) have been saved from switching to EV travel.
- Encouraging staff to use low-carbon and sustainable mobility options.
- Decarbonising our fleet.



90%

Eighteen months into the project, occupancy is running consistently at 90% with over 20,000 kWh of electricity being provided

100%
by 2020/21

Our goal is to make the most of all the materials we own and purchase, and to reuse or recycle 100% of our recovered assets by 2020/21

Responsible resource use

To build and maintain safe and reliable energy networks we need to use finite – or non-renewable – resources, such as steel for pylons, aluminium for overhead line conductors, and copper for transformers.

Our goal is to make the most of all the materials we own and purchase, and to reuse or recycle 100 per cent of our recovered assets by 2020/21. To achieve this we follow three principles: minimising waste, using resources more efficiently, and reusing and recycling materials.

Case Study 1:
Diverting surplus materials from landfill

Background
Disposing of excavated spoil from our construction and operational activities presents a big environmental challenge for us. Spoil can be generated from the waste material brought up during an excavation and we generate large amounts of it. Traditionally, this surplus material has been disposed of as landfill or put towards quarry restoration.

What have we done this year?
We have built on our external engagement work for the Northwest Coastal Connection and engaged with over 25 external stakeholder groups interested in using this free resource.

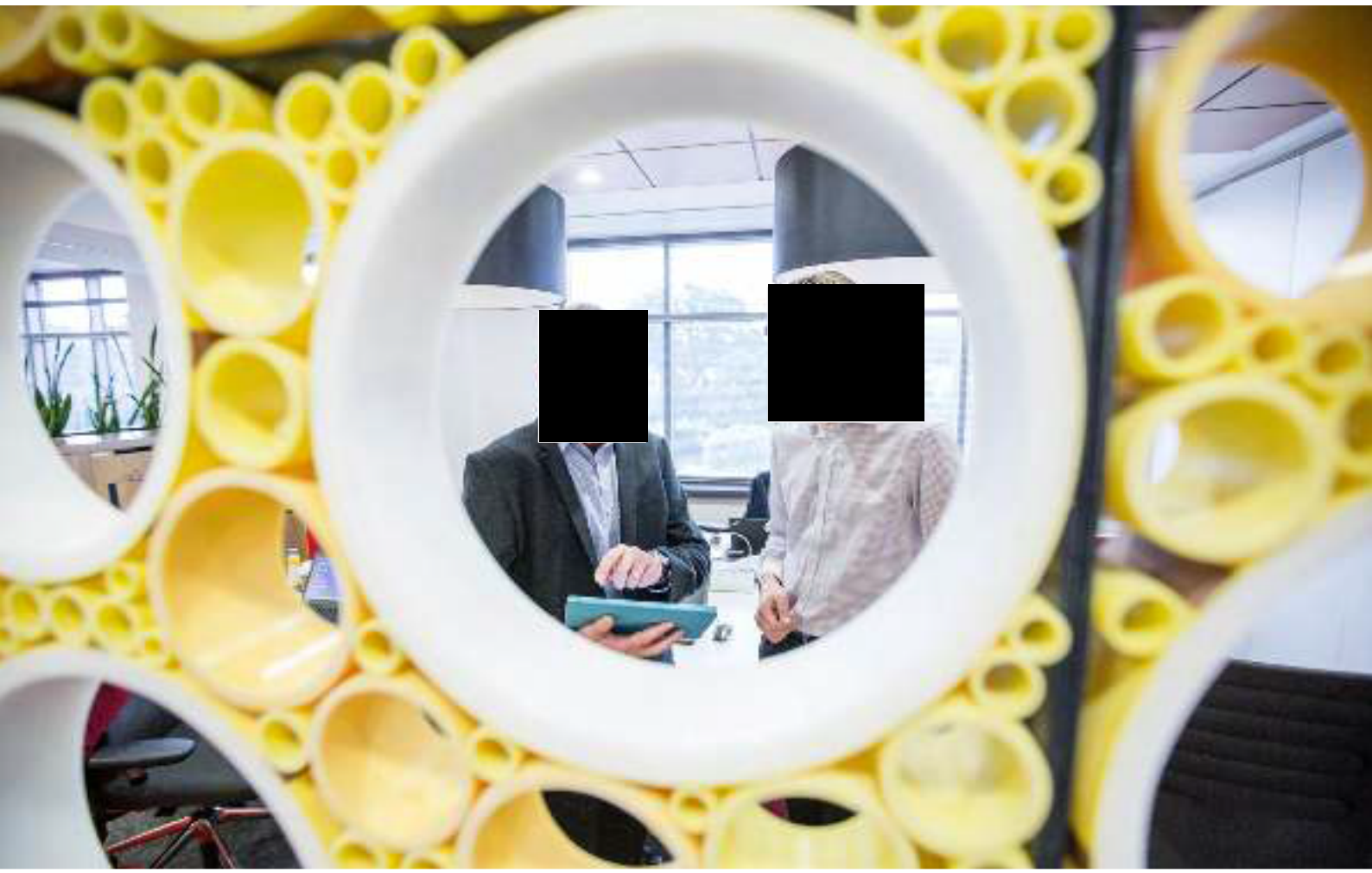
From the outset, a framework was developed to reach national bodies capable of using hundreds of thousands of tonnes of material, down to very local stakeholders who may only need a few tonnes.

In the case of the North Sea Link (NSL) in Blyth, Northumberland, the framework delivered a partnership project with charities Northumberlandia Country Park and Northumberland Wildlife Trust. NSL and its contractor donated surplus topsoil to the country park, delivering significant sustainability benefits and financial savings for both consumers and organisations. Ten tonnes of spoil were diverted from landfill.

What's next?
This project will now be used as a best practice example for expanding this approach and delivering real savings for the business while providing positive benefits for our communities and the environment.

In 2018 we will continue to identify reuse or recycling streams for the assets that are not already in one and look for ways to move assets currently in a recycling stream into a reuse scheme.

Environmental benefits
- Provides a resource for stakeholders to deliver (or enable new) projects.
- Diverted 10 tonnes of material from landfill.



What are circular offices?
A circular approach to the places we work. It's about changing the way we design, use and operate in these areas to eliminate waste and put resources back into use.

Case Study 2:
Adopting circular offices

Background
With approximately 6,000 colleagues in our UK offices, we are currently looking at the way we design, use and operate our offices to eliminate waste and create more efficient, resilient spaces which contribute to the long term sustainability of our business.

What are we doing now?
In 2017 we set ourselves the target to send zero office waste to landfill by 2020. To achieve this target we are working to improve recycling rates at our six main sites through influencing employees to change their mind-set towards reusing and recycling. We are currently achieving a 60 per cent landfill diversion rate.

When our IT equipment comes to the end of its useful life, we dispose of it in a responsible way. As of February 2018, we collected approximately. 6,000 pieces of used IT equipment. Four per cent were reused and 96 per cent broken down and recycled.

We also made donations valued at more than £13,000 to nine different charities, schools and organisations dedicated to healthcare and conservation.

What's next?
There are a whole range of things that we can do to move towards a circular office. We will continue to increase recycling and reduce waste contamination by continuing awareness campaigns and changing how we source, recycle and dispose of our office goods. In 2018 we'll particularly focus on plastic, as well as how we can refurbish or repurpose existing buildings using sustainable procurement principles.

Environmental benefits
- Landfill avoidance.
- Sustainable management of resources.
- Avoided emissions associated with the manufacturing of new equipment.

In 2017 we set ourselves the target to send zero office waste to landfill by 2020.

Caring for the natural environment

Our assets, operations and infrastructure have an impact on both the natural environment and the communities living around our sites. We own a huge amount of land, including more than 300 substations and the non-operational land around them. This puts us in a unique position to create a positive legacy.

It's important that we manage the land we own in ways that deliver the greatest value to us and our stakeholders. That's why we're working with local communities and stakeholders to use our non-operational land for schemes linked to local biodiversity and community projects. We are demonstrating how well-managed ecosystems can drive positive environmental, educational, enterprise and heritage outcomes, hand in hand with being good for business.

What is Net Gain?
Leaving biodiversity in a better state than before. It avoids losing biodiversity in the first place and involves partners to make important contributions towards regional and national priorities for conservation.

Case Study 1:
Expanding our capabilities: driving net gain

Background
Building on our natural capital approach, in 2017 we expanded the capability of our assessment tool to consider the biodiversity impacts and opportunities associated with our construction schemes to deliver net gain. The principle of net gain is to leave biodiversity in a better state than before. It requires doing everything possible to avoid losing biodiversity in the first place and involves partners to make important contributions towards regional and national priorities for nature conservation.

Project impacts and mitigation actions are mapped using the tool to demonstrate how our construction projects are delivering net gain in environmental value. We are currently trialling this approach on two major infrastructure schemes.

What have we done this year?
We are building a new 400kV Substation in Braybrook, Market Harborough, with the principles of biodiversity net gain. The project has been assessed using the net value tool, and with landscaping designed as part of the scheme, it indicates a significant increase in biodiversity units and natural capital value by delivering the landscaping structure.

To ensure net gain, Braybrook will incorporate new habitats, such as wetlands and grasslands. These new habitats will also help manage surface water run-off, reduce local flood risk, and reduce air pollution.

What's next?
A tender is being launched to deliver the Braybrook scheme, including the landscaping plan. As part of our sustainable procurement strategy, contractors are being incentivised to incorporate more sustainable best practices into the delivery stage.

In 2018 we plan to get the net gain tool integrated into the Network Development process so that supporting better decisions at earlier stages of the construction process is recurrent.

Environmental benefits
- Long-lasting contributions to local communities and to biodiversity.

2020

By 2020 we'll recognise and enhance the value of our natural assets on at least 50 of our sites.

What is natural capital?
Natural capital is the sum of our ecosystems, species, freshwater, land, soils, minerals, our air and our seas. These are all elements of nature that either directly or indirectly bring value to people, chiefly by providing us with food, clean air and water, wildlife, energy, wood and recreation. It's a financial representation of the benefits and services that these elements provide to society and businesses.

21%

increase in natural capital value realised through creation of wildflower meadows, introduction of grazing and beehives, woodland management and recreational/ volunteering opportunities.

Case Study 2:
Graduate Natural Grid

Background
Our 'Natural Grid' programme is transforming the way we manage our land and contributing to better, bigger and connected spaces for nature alongside our energy grids. In 2015 we developed a tool to recognise and account for the value of these natural assets, both to National Grid and our neighbours and communities.

We aim to have 50 'Sustainable Action Plans' (SAPs) in place by 2020. So far we have implemented 28 SAPs, of which 21 are on Electricity Transmission sites.

What have we done this year?
In early 2017, our cohort of 45 new graduates was challenged to develop innovative and sustainable ways to realise new value from non-operational land around our energy assets. At the same time, they were asked to focus on cost efficiency, safety, environmental risks, and community and stakeholder engagement – all benefits a proactive approach to land management brings.

Using our bespoke Natural Capital Tool, the teams created a natural capital baseline and a map of stakeholders who benefit or impact the natural environment. The graduates engaged with a broad range of external stakeholders and specialists from Natural England, Environment Agency, local schools and farmers to understand what approaches they could take.

What's next?
The project was very successful and is now a formal element of graduate training. It will continue to deliver SAPs for four to six sites a year, providing lasting change to communities.

Environmental benefits
The revised management approaches currently being implemented are predicted to deliver a wide range of benefits in six sites:
- 21 per cent increase in Natural Capital Value realised through creation of wildflower meadows, introduction of grazing and beehives, woodland management and recreational/ volunteering opportunities
- 24 per cent less safety and environmental risks through active management and increased site occupation
- usable green space for community volunteering and recreation.

Case Study 3:
Legacy Substation, North Wales

Background
As part of the Natural Grid Graduate Programme, we used a Natural Capital approach to our Legacy Substation in North Wales.

We identified opportunities to add value by engaging with stakeholders surrounding the site. We did this by measuring the natural capital value and engaging with organisations like the Wildlife Trust, the British Bee Keepers Association, HMP Berwyn (a local Category C prison) and two local schools.

The project delivered:
- installation of two beehives (with scope to install up to a further 10 hives in future)
- overgrown weeds in front of the station were replaced with wildflower meadows
- bug hotels were built offsite by local children with help from the Wildlife Trust
- inmates from HMP Berwyn made 21 traditional bird boxes and one larger Kestrel box for the site
- winning designs from a drawing competition in two local schools now feature on an educational sign along a public footpath, providing information about the sustainability project.

The outcome of the scheme has built long-lasting relationships in the communities where we operate in North Wales and has delivered environmental value on site by increasing natural capital by 35 per cent.

Environmental benefits
- 35 per cent increase in Legacy Substation's natural capital value.
- Engagement with the local community, including schools and a prison.
- Skills development for inmates at HMP Berwyn.
- New habitats created and increased biodiversity.

Excellent environmental management

Investing in and operating electricity networks affects the environment and the communities we serve. Our goal is to comply with regulations, reduce any impact that we may have, seek out opportunities to enhance the environment and embed sustainability in our decision making.

Our environmental policy provides the framework for managing environmental aspects, setting our key commitments, environmental aims, objectives and targets. Our Environmental Management System (EMS) provides a strong foundation for our environmental sustainability strategy. It helps to set goals for continual improvement, enhance environmental performance, and embed sustainability. It is intended to help us focus on addressing the most important environmental risks and opportunities. The EMS is independently verified to ISO 14001 standard and is externally assessed every year.

In 2017 we worked towards achieving accreditation against the ISO 14001:2015 standard and successfully attained independent certification.

Achieving ISO 14001:2015 Accreditation

What have we done this year?

In 2015 the ISO 14001 standard was updated in line with the latest environmental trends.

In 2017 we worked towards achieving accreditation and successfully attained independent certification to the ISO 14001:2015 standard. This demonstrates our commitment to the environment and means our customers and communities can be confident that we operate effectively and safely within a controlled framework.

To gain accreditation we demonstrated we had considered the context of our organisation, as well as the external environment we operate in, and increased efforts in life-cycle thinking; considering each stage of a product or service, from development to end-of-life.

Assurance visits

In 2016 we introduced an assurance visit programme to support our colleagues from across the business with any issues they may have at our operational sites. These give us the visibility to track how effective the EMS is and have constructive conversations with our site teams on how to improve environmental performance.

In 2017/18 assurance visits were continued and improved upon, to provide expert assurance and engagement on a rolling basis. This year we set ourselves the target of visiting 36 sites by the end of the financial year, an increase from 25 last year to support more sites on the ground, and we are on track to achieve this.

What's next?

In 2018/19 we aim to roll out an environmental training pack for everyone in the business. The pack is designed to help people with no environmental management knowledge understand the principal risks and opportunities embedded in our business. The target is for 80 per cent of all UK employees to successfully complete the course.

We're also improving the way we track and report our environmental incidents by building an improved framework of reactive and proactive reporting and environmental incident trend analysis. This change aims to improve our environmental performance and inspire us to challenge our accepted behaviours.

Leading innovation

Our strategy

Our energy networks are changing, so our success depends on us adapting to these changes. We are doing this by developing and rolling out new technology.

Our innovation strategy helps us to target our research programme. Our goal is to be an industry leader in innovative technologies, processes and solutions for electricity transmission networks. We'll achieve this by actively driving innovation to create value for consumers, customers and shareholders, focusing on four key themes: managing assets, service delivery, efficient build, and corporate responsibility. Our focus on corporate responsibility makes environmental sustainability a major factor in our innovation strategy.

We value working with our partners to drive growth for National Grid, the UK and the wider industry. This collaborative approach keeps us at the forefront of innovation.

After successful trials in 2016, the SF_6 free, gas insulated, busbars at Sellindge substation were successfully energised onto the 400kV electricity transmission system in April 2017. This is a world first.

Case Study 1:
An innovative SF_6 alternative - g^3 technology

Background

SF_6 is extensively used in high voltage switchgear due to its excellent electrical insulating and interrupting properties. It has a high Global Warming Potential (GWP), approximately 23,900 times that of CO_2. Identifying commercial alternatives to SF_6 has been the subject of research for many years with little success at voltages exceeding 75kV.

We worked with GE Grid Solutions to develop an alternative to SF_6 – Green Gas for Grid (g^3). g^3 is a new gas mixture that delivers the same technical benefits as SF_6 while reducing the GWP ratio from 23,900 to 345.

What have we done this year?

After successful trials in 2016, the SF_6 free, gas insulated busbars at Sellindge substation were successfully energised onto the 400kV electricity transmission system in April 2017.

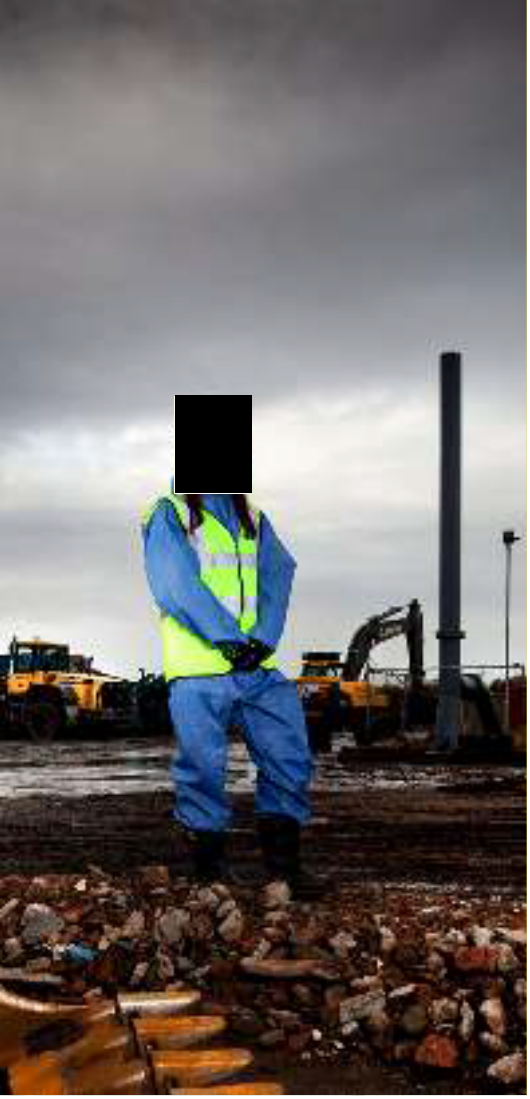
In addition, we engaged with SSE to share our learnings from the g^3 installation and discuss best practice techniques to repair SF_6 leaks. As part of this engagement we are now looking at a new approach to repairing leaking SF_6 equipment by using a bag that absorbs the SF_6 molecule, currently available from the Electric Power Research Institute.

What's next?

By taking the lead in this area we can promote and accelerate widespread development and deployment of SF_6 alternatives both in the UK and worldwide. We are now actively seeking further opportunities to extend the application of SF_6 free technology to a full Gas Insulated Substation (GIS) and find a better way to repair leaking SF_6 equipment.

Environmental benefits

- Using g^3 rather than SF_6 reduces the GWP from 23,900 to 345 times that of CO_2.
- The SF_6 replacement with g^3 in Sellindge has reduced our carbon footprint by 58,000 tonnes.



Case Study 2:
Novel acoustic reduction

Background
Where noise from the operation of our equipment may impact communities living near our sites, we look for ways to reduce the noise. We have been investigating new methods to minimise the impact of transformer noise from our new and existing installations. The current options that exist can either be overly expensive or limit maintenance access.

What have we done this year?
We commissioned a specialist organisation to prepare a report on novel, cost effective and practical approaches to noise reduction. Following a review of this report we have selected three options to further develop and carry forward to trial within our substation environments.

There is a bamboo noise barrier, specifically tuned to reduce low frequency tones associated with substations, an active noise control system that works on the principle of phase cancellation and thereby a reduction in noise, and an alternative noise enclosure that is potentially quicker to deploy, uses less resources and is tuned specifically to reduce low frequency tones associated with substations.

What's next?
We will be working with the researchers and suppliers of these three options to develop their product designs and specifications for use at transmission voltages, in order to trial on one or more of our live substations. The aim is to prove the concepts in order to roll out more widely.

Environmental benefits
- Reduce the impact of noise pollution on communities affected by noise from our High Voltage substations.
- Use of more sustainable materials, such as bamboo, reducing resource consumption.

Case Study 3:
Electromagnetic fields research

Background
In 2015 we conducted a research project with a consortium of partners in the Lawson Health Institute in Canada to learn more about how people are affected by exposure to electromagnetic fields (EMFs) at 50Hz – the frequency of the GB electricity transmission network. This three year project was completed in 2017.

What have we done this year?
The study measured the effects of different EMF strengths and frequencies on 130 volunteers. Research shows that the most sensitive response in humans is to something called magnetophosphenes – flickering of light in a person's peripheral vision.

The results of this project demonstrate that the public guidelines that we work with are orders of magnitude below the level of EMF that actually causes a detectable magnetophosphene effect at 50Hz. This reassures us that at 50Hz, the current guidelines more than adequately protect the public and employees from the acute biological effects of EMFs.

What's next
The results of this research will provide robust data that can be shared across the industry and can be used to formulate future guidelines on EMF exposure. We're now discussing the research with regulators and policy makers.

Environmental benefits
- This research enhances the safety and well-being of the public and stakeholders, ensuring adequate protection and peace of mind when using electricity.

Let us know what you think

The future of energy affects all of us. We welcome all feedback because it helps us make sure we're focusing on the right areas and delivering the right things.

We'll keep sharing information with you about the projects outlined in this document. We'll do this at events like our customer seminars and operation forums.

In the meantime, we'd really like to receive your views and ideas on the four questions:

- what do you think our key area of focus should be to ease the transition to a low-carbon future and why?
- what do you think our key area of focus should be to better manage our impact on the environment and why?
- is there anything else you would like us to include in the EDR annual statement?
- is there anything else you would like to comment on or share with us?

You can either use the link below to respond, e-mail your responses to talkingnetworks@nationalgrid.com or tweet us using the hashtag #SustainableNGrid

You can also use this e-mail address for queries and to ask for more information.

And here's the link to our survey: https://www.surveymonkey.co.uk/r/NG_EDR_2018

For more information visit us online: https://www.nationalgrid.com/group/responsibility-and-sustainability/environmental-sustainability

Twitter debate using #SustainableNGrid

Glossary

For more information please visit us online:
www.nationalgrid.com

Word Acronym Description

- **Ancillary service** anything that supports the transmission of electricity from its generation site to the customer. Services may include load regulation, spinning reserve, non-spinning reserve, replacement reserve and voltage support.
- **Carbon dioxide (CO_2)** the main greenhouse gas. The vast majority of CO_2 emissions come from the burning of fossil fuels.
- **Circular offices** a circular approach to the places where we work. It's about changing the way we design, use and operate in these areas to eliminate waste and put resources back into use.
- **Contract for Difference (CfD)** a contract between the Low Carbon Contracts Company (LCCC) and a low-carbon electricity generator, designed to reduce its exposure to volatile wholesale prices.
- **Demand Side Response (DSR)** a deliberate change to a user's natural pattern of metered electricity or gas consumption, brought about by a signal from another party.
- **Distributed generation** generation connected to the distribution networks, the size of which is equal to or greater than 1MW and up to the mandatory connection thresholds of the onshore transmission areas. The thresholds are 100MW in NGET transmission area, 30MW in Scottish Power transmission area and 10MW in Scottish Hydro-Electric Transmission transmission area.
- **Distribution Network Operator (DNO)** a company that owns and operates gas or electricity distribution networks.
- **Distribution System Operator (DSO)** distribution network operators take on the kind of system operator functions traditionally seen at a central transmission level.
- **Electromagnetic fields (EMFs)** are a combination of invisible electric and magnetic fields of force. They are generated by natural phenomena, but also by human activities, mainly through the use of electricity.
- **Electric vehicle (EV)** a vehicle powered by an electric motor. It can either be driven solely off a battery, as part of a hybrid system or have a generator that can recharge the battery but does not drive the wheels. We only consider EVs that can be plugged in to charge in this report.
- **Environmental Discretionary Reward (EDR)** a reputational and financial incentive in the RIIO T1 price controls of Scottish Hydro Electric Transmission Plc, SP Transmission Ltd and National Grid Electricity Transmission Plc (NGET) (Electricity Transmission Owners). The scheme currently takes account of NGET's dual transmission (TO) and system operator (SO) roles.
- **Environmental Management System (EMS)** the management of an organisation's environmental programmes in a comprehensive, systematic, planned and documented manner.
- **Gigawatt (GW)** 1,000,000,000 watts, a unit of power.
- **Global Warming Potential (GWP)** is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of CO_2.
- **Green Gas for Grid (g^3)** is a new gas mixture that delivers the same technical benefits as SF_6 while reducing the GWP ratio from 23,900 to 345.
- **Megawatt (MW)** 1,000,000 watts, a unit of power.
- **Natural capital** the sum of our ecosystems, species, freshwater, land, soils, minerals, our air and our seas. These are all elements of nature that either directly or indirectly bring value to people, chiefly by providing us with food, clean air and water, wildlife, energy, wood and recreation.
- **Net gain** leaving biodiversity in a better state than before. It avoids losing biodiversity in the first place and involves partners to make important contributions towards regional and national priorities for conservation.
- **Network Innovation Competition (NIC)** an annual opportunity for electricity network companies to compete for funding for the development and demonstration of new technologies, operating and commercial arrangements.
- **Sulphur Hexafluoride (Sf_6)** is an inorganic, colourless, odourless, non-flammable, extremely potent greenhouse gas, and an excellent electrical insulator.

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WRITTEN REPRESENTATION FOR
SPR EA1N and EA2 PROJECTS (DEADLINE 1)

SCHEDULE OF RELATED PROJECTS

Interested Party: SASES **PINS Refs:** 20024106 & 20024110

Date: 21 October 2020 **Issue:** 4

Project Name	Sponsor	PINS Reference	Published references	Likely Activity Dates (rough)
East Anglia 1 North wind farm	Scottish Power Renewables	EN010077	DCO Application	2021-2027
East Anglia 2 wind farm	Scottish Power Renewables	EN010078	DCO Application	2021-2027
NGET Leiston 400kV Substation	National Grid	Part of EN010077 & EN010078	Refer to page 20 para 2 of https://www.nationalgrid.com/uk/electricity-transmission/document/132296/download	2021-2025
Nautilus Interconnector	National Grid Ventures	Pre-Application	https://www.nationalgrid.com/group/about-us/what-we-do/national-grid-ventures/interconnectors-connecting-cleaner-future/nautilus and http://sases.org.uk/wp-content/uploads/2018/08/National-Grid-Briefing-Note-Interconenctors-Sizewell.pdf	2022-2028
Eurolink Interconnector	National Grid Ventures	TBA	http://sases.org.uk/wp-content/uploads/2018/08/National-Grid-Briefing-Note-Interconenctors-Sizewell.pdf	2022-2028
Sizewell B Relocation	EdF	N/A	https://rlfsizewellb.co.uk/	2022-2028

Reconductoring of Sizewell to Bramford OHLs	National Grid	N/A	Refer to para 5.1 of https://www.scottishpowerrenewables.com/userfiles/file/National_Grid_COIN_Process_Connection_Assessment_Note.pdf	2025-2027
Sizewell C Nuclear Power Station	EdF	EN010012	https://www.edfenergy.com/sites/default/files/edf-szc4-sumdoc_digital_compressed.pdf	2023-2035
Greater Gabbard Extension wind farm	North Falls	TBA	Event dates for https://www.northfallsoffshore.com/ Grid connection granted or pending	2022-2030
Galloper Extension wind farm	Five Estuaries	TBA	https://www.4coffshore.com/windfarms/united-kingdom/project-dates-for-five-estuaries-uk4i.html	2022-2028
SCD1 Interconnector	National Grid	TBA	Appendix 1 of https://www.nationalgrid.com/uk/electricity-transmission/document/134036/download NOA Page 100 refers to SCD1 https://www.nationalgrideso.com/document/162356/download	2022-2028
SCD2 Interconnector	National Grid	TBA	NOA Page 100 refers to SCD2 https://www.nationalgrideso.com/document/162356/download	2025-2032
Other projects targeting “Sizewell”	TBA	TBA	NGET Investment Decision Pack Page 17 refers to East Anglia Offshore Wind connections: https://www.nationalgrid.com/uk/electricity-transmission/document/132296/download NGESO Review document page 112 refers to Sizewell https://www.nationalgrideso.com/document/177221/download	2025-2035